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ON

# EXCISION OF THE WRIST-JOINT.

BY

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ON

## EXCISION OF THE WRIST-JOINT.

THE operation of excision of the wrist-joint has been so seldom performed, as compared with excision of the larger joints, as the elbow and knee, and its results have been so little recorded, that I consider it only right to bring under the notice of the profession, the particulars of some cases which have come under my observation. In each instance the operation has been performed some years, and therefore a fair opportunity is afforded for judging of the ultimate result of the operation in suitable cases.

I shall describe, as briefly as possible, the condition and progress of the patients prior to the operation. I shall give in detail the particulars of the operation, and the course of treatment adopted subsequent to its performance. I shall then endeavour to draw some inferences from these, and other resections of the wrist-joint, which have been done during the last few years, as to the most suitable manner of performing the operation; and, lastly, consider the circumstances which would determine the advisability of excision of the wrist, in preference to amputation of the forearm in cases of extensive injury or disease of the wrist-joint.

Mary Horton, married, aged forty-three, became an out-patient of the Queen's Hospital, Birmingham, in the beginning of April, 1865, with great enlargement of the right wrist-joint, which had existed more or less for three years, and which was owing, according to her account, to a needle having run into the ring finger of the right hand while she was engaged in washing some clothes. The needle was removed entire, but shortly after a swelling formed in the palm of the hand, which, getting larger, extended to the front of the wrist in one direction, and up the fingers in the other, and caused the latter to become painful and stiff. The pain, swelling, and stiffness had rendered the hand and fingers perfectly useless for many months; no abscess had formed; the

swelling was brawny and dense—was most marked over the wrist-joint, particularly on the dorsal aspect, but afforded only an indistinct sense of fluctuation. She stated that she had never had either acute or chronic rheumatism; that her general health was good, although her family were delicate—her mother and only sister having died of consumption; that she had lived very poorly of late, her husband having been out of work; that she was the mother of four children, whom she endeavoured to support by working as a washerwoman.

She was pale and weak; suffered greatly from pain, which prevented her resting at night, and gave her a very enfeebled and emaciated appearance. She was ordered citrate of iron and quinine, generous diet, and a sedative draught to be taken each night.

The wrist-joint was enveloped in Scott's dressing, and supported on a splint in a prone position.

It is needless to give a detailed account of her progress during the next six weeks; suffice it to say that the pain and swelling increased, hectic symptoms showed themselves, and an abscess, pointing at the back of the wrist-joint, was imminent, when I decided to resort to excision of the wrist-joint; the patient, after having been informed of the critical position in which she was placed, preferring to subject herself to the risk of that operation rather than to submit to the loss of the right hand and part of the forearm.

Accordingly, on the 24th of May, 1865, the patient was brought into the operating theatre, and placed under chloroform. A tourniquet having been lightly placed over the brachial artery, so as to command that vessel in case of hemorrhage, I commenced my first incision on the dorsal surface of the hand, about two inches below the styloid process of the radius, and just to the ulnar side of the extensor secundi internodii pollicis tendon, and keeping this as my guide, continued it upwards to about three inches above the wrist-joint.

I then made a second incision of an equal extent along the ulnar side of the back of the hand, and the lower part of the forearm. Both incisions were carried carefully down to the wrist-joint, which was then opened, the hand being forcibly bent downwards while this was done, and while the external lateral ligament of the wrist-joint was being divided. The extensor tendons of the thumb were then drawn outwards towards the radial side, and, protected by a spatula, while the handle of the scalpel was passed beneath the tendons of the extensor communis digitorum and extensor minimi



digiti, so as to liberate them as much as possible from the fibrinous deposit in which they were embedded, and to enable them to be moved to either side of the forearm, as was necessary in the subsequent part of the operation. The internal lateral ligament and the extensor carpi ulnaris tendon were then divided, and the lower end of the ulna having been pushed through the ulnar wound, was cut off with bone forceps just above the styloid process. I had more difficulty in getting the radius exposed; careful dissection was necessary on the palmar surface, the edge of the knife being kept as close as possible to the radius until the bone could be forced through the opening on the radial side of the forearm, when the common extensor tendon having been drawn to the ulnar side, and the extensor carpi radialis longior and brevior tendons having been divided, about one inch of the radius was removed by Butcher's saw, which was for that purpose introduced on the anterior surface, and made to cut backwards and upwards.

Both radius and ulna were found to be carious, as also the first row of carpal bones, which were now removed one by one.

This was the most tedious part of the operation, each requiring to be seized with small, but strong, bone forceps, and carefully dissected out, the knife being kept as close round the surface of the bone as possible, so as to prevent its point from getting deeply into the structures on the palmar surface of the hand. All these bones were more or less carious, and some difficulty was experienced in severing them from their connexions with each other, and with the surrounding parts, in consequence of the great amount of fibrinous infiltration which surrounded them. The second row not appearing at that time to be involved in the disease, were suffered to remain. Not much hemorrhage occurred during the operation, and only one vessel required the application of a ligature; the edges of the wounds on either side of the hand were approximated by three interrupted silver sutures, and the hand having been placed on a well-padded straight splint, in a position of pronation, was supported by a bandage, and the patient then removed to bed.

No bad results followed the operation; the wounds partially healed by the first intention, and the patient's condition improved sensibly. The splint was changed for a shorter one, which only extended as far as the commencement of the fingers, a week after the operation, and she was ordered to have the fingers moved a little every day. A daily record of the patient's progress showed that, although her general condition steadily improved, still a

considerable purulent discharge kept up from the arm, and it became evident that mischief was going on in the carpal bones, which had been suffered to remain. In September, my colleague, Mr. Wilders, who kindly took charge of the patient during my absence from home, found it necessary to remove some loose fragments of carious bone from the carpus, but the parts were so altered by disease, that it was almost impossible to say what were the exact parts removed, but from their situation they were judged to be parts of the os magnum and unciform.

In October a small piece of bone came away with the discharge, and at the end of that month she was able to leave the hospital. During the following month two more small carious fragments were also discharged. Since then no bone has either come away or required to be removed, but the parts have slowly, but gradually, consolidated. A few small abscesses formed during the early part of 1866, but these did not appear to communicate with any fresh caries of the bones. Her recovery would probably have been more rapid, had she been perfectly supplied with nutritious food, and been able to get to a convalescent institution, or to the seaside, but during the greater part of the time which has elapsed since the operation, her husband has only been partially employed, and his wages never exceeding a pound a week, she has not been able to have such a diet as was really necessary for a woman in her condition. To add to her difficulties she became *enciente* towards the end of 1866, and she was delivered of a healthy female child on July 12, 1867, which she nursed for several months.

The arm now presents the appearance shown in Plate I., Figs. 1 & 2; it is, of course, considerably shortened, but there has been a great amount of osseous and ligamentous deposit between the metacarpal bones and the lower ends of the radius and ulna, and the parts feel firm, and bear pressure everywhere without causing her pain; she is able to pick up a sheet of paper or a pen from the table, and can without difficulty approximate the thumb and forefinger. She tells me that she is able without assistance to dress her baby, and can bear its weight on her right forearm, at the site of the joint, without inconvenience; sensation is perfect in all her fingers, and slight power of flexion exists in the distal phalanges, but any attempt to bend the proximal ones, or to close the hand, causing her pain, she refrains from doing so. I have several times bent the fingers for her, and have advised her to keep bending them herself, but I fear she does not do so as much as she

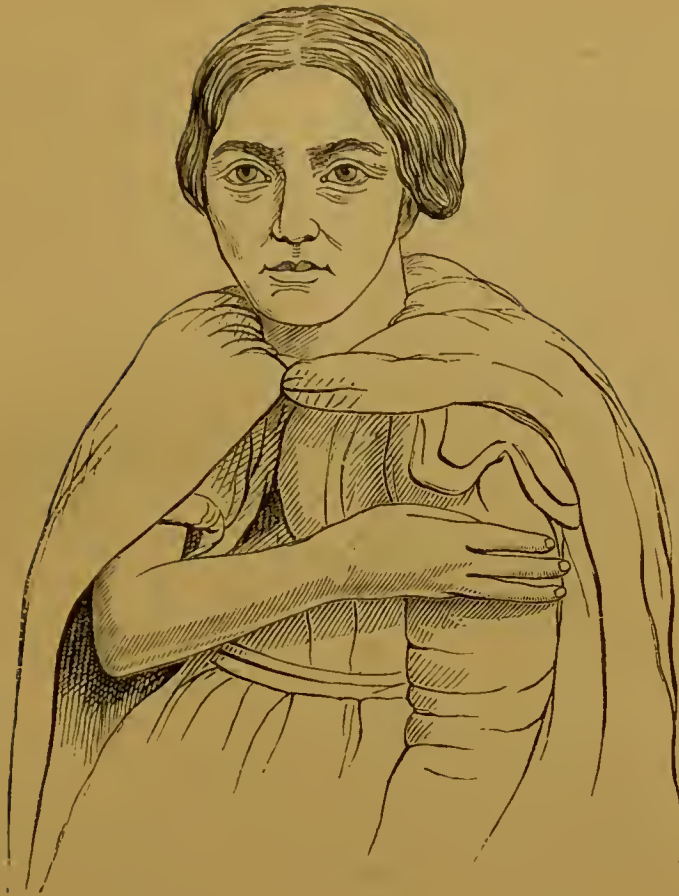


Fig. 2.







ought; the fingers are now free from swelling, and she is gradually accustoming herself to use them more and more.

I append a comparative statement of the measurement of the sound arm and of that from which the wrist has been removed, in various situations, taken recently; from which it will be seen that the amount of alteration in size is not so great as to cause marked deformity, and certainly less than might be expected:—

	Left Arm.	Right Arm.
Measurement from tip of olecranon to end		
of little finger - - - - -	14 $\frac{1}{2}$ inches	14 inches.
„ „ „ middle finger	16 „	14 „
„ „ „ thumb -	14 $\frac{1}{4}$ „	13 „
„ around the wrist - - -	6 „	6 $\frac{1}{2}$ „

William Hancox, aged twenty-three, porter, Birmingham, admitted into the Queen's Hospital, April 18, 1867.

On admission stated that sixteen months ago he noticed, on getting up one morning, a swelling on the back of his right wrist, accompanied by a good deal of pain on moving the hand; he was ordered by his medical attendant to keep his bed, and apply poultices to the wrist. In about three days he complained of great pain in the joints of the extremities, accompanied by fever; he was confined to his room for about six weeks with rheumatic fever, at the end of which time he was able to resume his employment. During the time he was confined to his room the swelling of the wrist had been opened by a surgeon, and a quantity of pus let out. In the course of a short time six or seven small abscesses formed in the neighbourhood of the joint, and discharged small quantities of pus; the openings thus formed did not heal, but continued discharging more or less until his admission into the hospital. The joint was rendered useless, and the fingers could not be moved. He stated that he had always enjoyed good health previous to this rheumatic attack, and that his relations were all healthy. For the last four months he had been unable to use the joint sufficiently to enable him to attend to his usual occupation; various remedies have been applied, but without the smallest benefit. On examination, the right wrist-joint was found to be greatly swollen, with numerous sinuses situated over the posterior surface of the joint, especially on the radial side, all discharging freely, and all leading to diseased bone.

The patient, from being a stout-built healthy man, was reduced

to a mere skeleton; the exhausting pain and profuse discharge having evidently greatly reduced his constitutional powers.

April 24th.—After the administration of chloroform I ascertained, by careful probing, that the chief part of the disease was in the radius, the sinuses over the ulna, although leading down to that bone, not finding it exposed, while the carpal bones also appeared free from caries.

I therefore determined to make less extensive exposure of the parts than in the previous case, and simply contented myself with a single longitudinal incision in the median line of the forearm, from a point three inches above the wrist to one about one inch below, and joining this about opposite the joint with a superficial transverse incision, an inch in length, extending towards the styloid process of the radius.

I carefully deepened the longitudinal incision until I had exposed the extensor tendons, and then, having separated them at their middle with the handle of the scalpel, I made my way down to the wrist-joint, which I opened freely on its dorsal aspect. The hand was then forcibly bent forwards and backwards, so as to free the parts, and make them more mobile, and then the lower ends of the radius and ulna were minutely examined, the tendons being held aside by retractors, and every precaution being used to prevent the division of any of them. A cavity large enough to hold a marble was found in the lower end of the radius, and the bone for an inch above it was found to be soft and carious. The external border of the radius was therefore cleared about two inches above the lower end of that bone, the superficial transverse wound before mentioned giving sufficient room for the movement of the knife, the handle of which was more used than the blade in the separation of the pronator quadratus, and the soft parts lying on the anterior surface of the forearm. A curved needle, armed with a ligature, to which the chain saw was attached, was then passed around the radius at this point, and brought out through the interosseous membrane, and the handle having been applied to the saw, the bone was rapidly cut through. The lower fragment was then seized with lion-bone forceps, and dragged downwards, the point of the knife dividing any attachment to subjacent parts, and finally drawn from its place, after division of the tendon of the supinator longus, and the external lateral ligament. The lower end of the radius having so long been the seat of caries, and pus having existed in the joint, it seemed not unlikely that the lower surface of the ulna might be involved

in the disease, even though its shaft was evidently free from it. To make quite certain of the matter, I thought it advisable to force the hand downwards, and towards the ulnar side, but not being able by this means to obtain a sufficient view of the parts, I divided the internal lateral ligament, and was then able to bring the lower end of the ulna through the wound on the dorsal surface of the wrist-joint. I found that it was free from caries. I therefore returned it to its place, and having then examined the first row of carpal bones, and seen that they were all free from disease, I left them undisturbed.

No vessels required ligature. I closed the wounds by four silver sutures; supported the forearm and hand on a splint in a prone position, and with a few turns of bandage, above and below the joint, steadied the limb; cold spirit lotions were then applied.

April 25th.—Slept the greater part of the night; he felt very comfortable; pulse 100; ordered to have mutton diet, with a pint of beef-tea; an opiate if necessary.

April 27th.—Suffers little or no pain in the wound, and the limb preserves a nice temperature; pulse 90; tongue very red, but not dry; bowels open; ordered four ounces of sherry; limb re-bandaged, and water-dressing continued as before.

April 30th.—Sutures removed; greater part of both incisions united. Free discharge of healthy pus. Takes animal food well, and is in excellent spirits. Splint applied as before, but with rather more padding on radial side.

May 4th.—Profuse suppuration. Eats, drinks, and sleeps well. Wrist to be dressed with lotion of permanganate of potash.

May 8th.—Continues to improve; discharge diminished; has been moving about the ward for the last three days; the limb resting on the splint, and being supported in a sling, but the ends of the fingers left free. To take two grains of quinine three times a day.

May 14th.—There is still great discharge, and the old sinuses remain open; health is not good; goes out on the green every day, and lives well.

May 28th.—Parts still puffy and swollen; discharge abundant; no pain in the part, except when it is dressed, or when the fingers are moved; ordered to go to the Sparkhill Sanatorium. There he remained till August, steadily improving, the arm diminishing in size, the sinuses many of them closing, and his health becoming vastly more vigorous. About the middle of that month he caught cold from exposure to wet; rigors came on, and were succeeded by



great febrile excitement; an abscess formed up the forearm on the radial side, and many of the old sinuses began to discharge afresh. On August 24th he was re-admitted to the hospital; several sinuses were laid open, and some of them which communicated with each other were connected by Chassaignac's drainage tubes. These were introduced by our excellent house surgeon, Dr. Jolly, who throughout has taken great interest in the case, and to whose careful dressing the favourable result is in no small degree to be attributed. The drainage tubes were ordered to be syringed out with the permanganate of potash lotion every night and morning. He was also ordered a chop, beef-tea, milk, and four ounces of sherry daily, and to take two grains of quinine, with ʒi. of tincture of hop, and five drops of dilute sulphuric acid three times a day. Under this treatment he soon improved; the discharge diminished, so that at the end of a fortnight the drainage tubes were removed; the fistulous openings began to close, and the only inconvenient symptom was a great amount of soft swelling over the lower end of the radius. To obviate this he was ordered to have the arm more firmly bandaged, and to have pressure kept up by means of some thin sheet-lead applied round the lower part of the forearm.

Towards the end of October, the short splint, leaving the fingers quite free, was resumed, and free movement of the fingers was made by Dr. Jolly every day; the sheet-lead was still used, as the swelling was gradually decreasing under its use; his health was again good, and he was allowed to go out of the hospital for a walk every day.

During November the sinuses gradually healed; the puffy swelling went down, and in its place could be felt firm fibrinous deposit at the site of the excised bone. The power of flexion and extension of the fingers returned to a great extent, so that he could pick up a book, or hold a pen.

At the present time all the fistulæ are healed. The parts can be handled without causing him pain, and they feel firm and compact; the styloid process of the ulna projects in rather an unsightly manner, but, with that exception, the appearance of the joint is admirable (Plate II., Figs. 1 & 2), and his power of using it, and also of flexing or extending the fingers, is so perfect that he is, and has been, able, ever since he left the hospital, to carry on his employment as porter in a large drapery establishment without any difficulty. I give a fac-simile of his handwriting; and, I may also add, that he can lift a heavy weight.





Fig. 2.





	Left Arm.	Right Arm.
Measurement from tip of olecranon to end of little finger - - - - -	15 inches	12 $\frac{1}{2}$ inches
"    "    "    middle finger	17    "	16 $\frac{3}{4}$ "
"    "    "    thumb - - -	15 $\frac{1}{2}$ "	13 $\frac{1}{2}$ "
"    around the wrist - - -	7 $\frac{3}{8}$ "	8 $\frac{3}{8}$ "

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Excision of the wrist appears to be an unpopular operation even with those who are the most strenuous advocates for the excision of other joints; this is probably due in no slight degree to the rules for its performance being less clearly laid down than those which experience has assigned as the most suitable for other excisions, but may also be attributed to its having been less frequently performed, in consequence of a rather ill-founded prejudice against it.

I believe that a more extended trial of the operation will lead to its being received into the general list of operations, which are not only justifiable, but also necessary in well selected cases.

Mr. Holmes, in his excellent essay on "Excision of Joints," in Vol. iii. of the *System of Surgery*, states that "no operation appears advisable when the whole carpus is involved in chronic disease," alleging, as a reason, that the patient may recover if the strumous cachexia is not too far advanced, while if it is, he will not recover from the operation more than from the disease.

If the same line of argument were used in cases of caries of the bones entering into the formation of the elbow or knee, it would be necessary to decline to operate in almost every case where resection of those joints is now performed. Either an expectant treatment or amputation would have to be recommended; yet resections of the

elbow and knee are daily performed, for the purpose of getting rid of the carious bone, and so relieving the strumous cachexia by which the utility of the joints have either been destroyed or impaired, and so of giving the patients a chance of a useful arm or leg. That the whole of the carpal bones may be removed, even in strumous subjects, and yet the patients live for a considerable time is evident, from the record of these, and other cases published by Professor Lister and Sir Wm. Fergusson; while I think that it must be admitted that, even supposing the hand preserved has but little mobility, as Mr. Butcher concisely puts it, "a stiffened hand and wrist is better than no hand at all."

I do not believe that as an operation it is so barren of success as to deserve to be stigmatized as it is by M. Malgaigne, who, after reviewing the various modes of performing the operation, and the cases in which it has been employed, expresses this opinion, "C'est done une operation deplorable, et qu'il est temps de rayer absolument de la pratique."

I may cite in opposition the case of the soldier from whom, in 1762, Beyer removed the whole of the bones entering into the formation of the wrist-joint, together with the metacarpus, for a gunshot wound, in whom recovery followed, and the patient is said to have preserved the form of his hand.

Also the case in which M. Dietz, in 1839, took away the articular ends of the radius and ulna, together with the bones of the carpus, from a man, forty years of age, who lived four years after the operation, although he then had to submit to amputation, in consequence of caries occurring in the upper ends of the metacarpal bones.

I do not think that, although the case recorded by Mr. Butcher was followed by death in eight days, the result was due to the particular nature of the operation performed, as it is stated (*Operative and Conservative Surgery*, page 211) that "there was no local manifestation of mischief; on the contrary, repair had rapidly advanced;" but was due to such circumstances as are common to all operations, and might have occurred to the patient had amputation of the forearm been performed instead of excision of the wrist-joint.

Where only the lower end of the radius or ulna is affected singly, cases ending favourably are even more numerous than where both bones of the forearm are implicated; many cases might be cited, but two examples will suffice:—

In 1841, M. Ricord removed the lower third of the radius of a



young man, twenty-three years of age, who was the subject of caries—the operation performed being almost identical with that adopted in my second case, and with an equally good result: the patient recovering in the course of six months, with a perfectly useful hand.

In 1862, I removed, by a single longitudinal incision, about two inches of the lower end of the ulna of a woman, aged thirty-six, who had for thirteen years been troubled with abscesses about the forearm, for which she had been recommended by Mr. Wood to submit to amputation of the forearm at the General Hospital, Birmingham. Necrosis had resulted from a severe fall against a chair, which, to use her own words, “had bruised the bone.” The line of incision healed rapidly, so that the patient was able to leave the hospital in a few weeks, but during the succeeding twelve months three small pieces of carious bone came away, and then the parts became firmly cicatrized, and no further trouble has since arisen about the wrist. She has now a useful hand, both pronation and supination being well performed. The lower end of the ulna is nicely rounded off; the forearm is shortened about an inch on the ulnar side, and the little and ring fingers are slightly flexed up on the palm, but can be easily extended, and both of them have preserved both their sensibility and mobility.

These cases may, perhaps, not be looked upon as excisions of the wrist-joint. They are clearly not complete excisions, but in cases of excision of the elbow the amount of bone removed is very variable; the head of the radius often, when unaffected by disease, is left intact, and yet these cases are none the less recorded as instances of excision of the elbow-joint. Again, in the cases of so-called excision of the ankle, the parts removed have rarely included all the bones entering into the formation of that joint. In excisions of the knee-joint, the patella, if unaffected by caries, is not generally removed by the surgeon. It is sufficient for the purpose of the surgeon to remove whatever portions of bone are affected by caries at the time of the operation, and to leave untouched those that are not obviously affected by that disease. In the early cases of excision of the wrist it was the practice to make an oval or semi-circular incision down to the wrist-joint, dividing in this way all the tendons. In the operations performed by M. Velpeau and Mr. Stanley, all the tendons, and even in Mr. Butcher's case the extensor tendons of the four fingers were cut; but in the more recent cases by Sir W. Fergusson and Professor Lister, all the tendons

of the thumb have been left, and also those of the common extensor of the fingers. I believe increased experience will prove that however much they have been matted together by inflammatory exudation, it is better to avoid cutting these tendons, and that the result obtained thereby will be a far more useful hand than if they are divided in the course of the operation.

In deciding as to the cases most likely to be successful after excision, much will, of course, depend on the age and constitutional powers of the patients. In children and young people caries commencing in the carpus is so apt to rapidly progress from one bone to another, and also to involve the metacarpal bones, that the operation, if performed, should be done early. In all cases a good result is more likely to follow if the caries is only limited in extent, and consequently a smaller amount of osseous structure has to be removed. There can be no doubt that when caries commences in the articular end of either radius or ulna, those parts should be removed early (as in the case of William Hancox) before the disease has time to extend to the carpus. There are numerous cases on record showing the good results of removal of the lower ends of both radius and ulna, either in severe compound fractures of those bones involving the wrist-joint, or for extensive caries. Chassaignac (*"Operations Chirurgicales,"* tome premier, page 630) gives the particulars of many successful cases occurring in the practice of Clemot, Guepartte, Hublier, the elder Moreau, and Adelman, where it is evident that the articular ends of the radius and ulna, as well as the carpal bones, had been the seat of caries.

I think the best and easiest way of performing the operation is by two longitudinal incisions extending along either side of the dorsum of the wrist, from about two inches above to two inches below the joint—the radial incisions keeping to the ulnar side of the tendon of the extensor secundi internodii pollicis, and the ulnar being rather on the anterior surface of the ulna, but close to that bone, and extending as far as the base of the metacarpal bone of the little finger. These incisions, if sufficiently long, will enable the operator, without much difficulty, to get away all the parts affected by disease, and no transverse incision will be needed. None of the extensor tendons of the thumb should be injured, nor should the common extensor of the fingers on any account be divided. They may, after being freed from the subjacent parts by the handle of the scalpel, be drawn to either side, according as either the radius or ulna is being operated on. By using the

chain-saw the parts are much less disturbed than when Butcher's saw is employed; the radius or ulna must be firmly steadied by an assistant holding the forearm, while the fragment to be removed is secured by the lion forceps in the hand of another assistant. Too much importance cannot be placed on early movement of the fingers; probably a week or nine days after the operation it will be advisable to shorten the splint, so that it does not extend beyond the base of the fingers, and then motion should be commenced by the patient himself, or by the nurse in attendance. Free openings should be left for discharge of matter during the progress of the case, and drainage tubes may be introduced with advantage when sinuses remain in the neighbourhood of the joint.

Probably six to twelve months will elapse before there is much consolidation of the parts at the site of the excision, and before the hand can be of very great use; but even if three or four times that period is required before much benefit is evident, the patient will be far better off than if he had submitted to such a formidable mutilation as the loss of a hand.

Good nourishing diet, and removal to the pure air of the country, are, no doubt, as after all operations, of the greatest importance. Had my patient, Mary Horton, been able to avail herself of these circumstances, I cannot doubt that her progress would have been more rapid. In Hancox's case removal to a Sanatorium some miles from Birmingham was followed by a marked improvement of both the local and general condition.

In conclusion, I trust that my surgical brethren may be induced to give this operation a more extensive trial than it has yet enjoyed, and I am confident that in the hands of many of them even better results may be obtained than in those cases which I have narrated.



















